MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

5 MARCH 2020
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.

2. Answer all **FOUR (4)** questions.

3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

4. The formula sheet is attached at the end of this question paper.

Question 1 (25 Marks)

(a) Perform the indicated operation and simplify.

$$\left(18x^4-2x^3-7x+8\right)-\left(9x^4-6x^3-5x+7\right)$$

[2 marks]

(b) Simplify the following expression.

$$\frac{1}{1+p^{x-y}}+\frac{1}{1+p^{y-x}}$$

[5 marks]

(c) Solve the following equation by using the quadratic formula.

$$3x^2-4x-4=0$$

[6 marks]

(d) Solve the following equation.

$$3(x-4)+4(x-3)=x+3+(x-2)$$

[3 marks]

(e) Solve the following inequality. Graph the solution set on a number line. Next, express the solution set using interval notation.

$$5(3-x)\leq 3x-1$$

[5 marks]

(f) Find an equation of the straight line that passes through point (5, 8) and is parallel to the line $y=x+5$.

[4 marks]

Continued...

Question 2 (25 Marks)

(a) If $A=\begin{bmatrix}2 & 4\\ 5 & 3\end{bmatrix}$, $B=\begin{bmatrix}1 & 2\\ 0 & 3\end{bmatrix}$ and $C=\begin{bmatrix}1 & 4\\ -2 & 1\end{bmatrix}$.

(i) Find $2A-3B+C$.

[4 marks]

(ii) Find $A(B+C)$.

[3 marks]

(b) Consider the following system of linear equations.

$$x+2y+3z=2$$
$$2x+3y+4z=7$$
$$x+5y+7z=1$$

(i) Write the system of linear equation above in a form $Ax=B$.

[3 marks]

(ii) Find A^{-1}.

[12 marks]

(iii) Solve the system of linear equations above by finding the value of x, y and z.

[3 marks]

Question 3 (20 Marks)

(a) Find the first four terms of the following sequence.

$$a_n=2+5n \;;\; n=1,2,3,...$$

[8 marks]

(b) Given the arithmetic sequence is 7, 19, 31, 43,..., find

(i) the common difference,

[2 marks]

(ii) the 10^{th} term,

[3 marks]

(iii) the sum of terms from fifth to the twelfth inclusive.

[7 marks]

Continued...

Question 4 (30 Marks)

(a) Find the first derivative of the following functions. Simplify your answer.

(i) $f(x)=4x^2-3x+6$

[2 marks]

(ii) $f(x)=(x+2)(3x^2-2x+1)$

[6 marks]

(iii) $g(t)=\sqrt{\frac{t+1}{3t+2}}$

[6 marks]

(b) Find the second derivative of the given function

$$f(x)=\frac{2}{x^3}+4x^2-15x.$$

[4 marks]

(c) Find the indefinite integrals. Simplify your answer.

(i) $\int(0.3t^3+0.06t+2)\ dt$

[3 marks]

(ii) $\int\left(\frac{x^3+2x^2-x}{3x}\right)\ dx$

[3 marks]

(d) Evaluate the following integral.

$$\int_0^1 x\sqrt{5x^2+4}\ dx$$

[6 marks]

End of Page.

Summary of Formulas

1. Basic Rules of Differentiation

i) $f'(x)=0$

ii) $f'(x)=nx^{n-1}$

iii) $cf(x)=cf'(x)$

iv) $f(x)\pm g(x)=f'(x)\pm g'(x)$

v) $f'(x)=u\dfrac{dv}{dx}+v\dfrac{du}{dx}$

vi) $f'(x)=\dfrac{v\dfrac{du}{dx}-u\dfrac{dv}{dx}}{[v]^2}$

vii) Chain rule: $\dfrac{dy}{dx}=\dfrac{dy}{du}\times\dfrac{du}{dx}$

viii) General power rule: Derive $[f(x)]^n=n[f(x)]^{n-1}f'(x)$

2. Basic Rules of Integration

i) $\int k\ du=ku+C$

ii) $\int u^n du=\dfrac{u^{n+1}}{n+1}+C$

iii) $\int kf(u)\ du=k\int f(u)\ du$

iv) $\int[f(u)\pm g(u)]\ du=\int f(u)du+\int g(u)du$